Naval Health Research Center *San Diego, CA*

NHRC UPDATE

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NHRC Researchers Identify Health Outcomes of Navy POWs From Vietnam

At the close of the Vietnam War, the Center for Prisoner of War Studies was established at the Naval Health Research Center (NHRC) to coordinate the medical aspects of the POWs repatriation,

identify short-term medical effects, and document the process of social reintegration. Having successfully completed this mission, the Center for Prisoner of War Studies was disestablished in 1978; however, the annual medical follow-up program established in collaboration with the Naval Aerospace and Operational Medical Institute (NAOMI), Pensacola, Florida, continued. In this program, the POWs and a matched comparison group receive an extensive medical and psychological examination in Pensacola each year.

In 1993, 20 years after the POW repatriation, researchers at NHRC worked in partnership with medical and computer specialists at NAOMI to convert the thousands of pages of medical examination records into an electronic database for computer analysis. In a recent article published in the *Journal of the American Medical Association*, Dr. Nice and his colleagues, Ms. Sue Hilton and Dr. Cedric Garland from NHRC, and Dr. Baggett and Dr. Mitchell from NAOMI, reported their findings on the long-term health outcomes of the U.S. Navy prisoners of war in Vietnam.

Of the 47 diagnostic groupings that were analyzed, 4 demonstrated significant differences between POWs and the comparison group. Although there were no significant differences in life-threatening disorders such as cardiovascular disease or cancer, the POWs had significantly higher rates of disorders of the peripheral nervous system (particularly upper limbs), arthropathy (joint disorders), dorsopathy (back disorders), and peptic ulcer. Many of these effects were believed to be associated with the torture incurred during their long years of imprisonment. During captivity, which lasted an average of 5 years, ropes, ratchet handcuffs, leg irons, or stocks were used to put tightly constrictive pressure around an extremity, most often the upper arm, and were left in place for several minutes to a few hours. The resulting ischemia was extremely painful, and it produced swelling and persisting neuropathies (nerve damage). Often, POWs were unable to write, shave, or even properly feed themselves for as long as 3 months after such treatment. Paresthesias accompanied the motor impairment and generally persisted in the form of numbness or decreased vibratory sense through the time of repatriation. The increased incidence of peripheral nerve damage and arthritis at the time of this study indicates that many of these effects may be permanent.

Although many of the POWs from World War II and Korea experienced psychiatric symptoms, such as Posttraumatic Stress Disorder, these effects were not found in the Navy POWs from Vietnam. Because all but one of the Navy POWs were officers in naval

aviation, Dr. Nice and his colleagues attribute this resilience to a combination of factors, including selection, training, and the long-term medical follow-up. As this cohort of POWs and comparison group members continues to age, NHRC researchers may gain additional insights into the psychosocial and physiological associations with chronic disease and the medical management of former POWs.

NHRC Scientists Lead Navy Health Promotion Efforts

For more than a decade, the Naval Health Research Center has been a leader in health promotion research in the Navy, and much of this effort has focused on the use of tobacco. It has been estimated that more than 400,000 Americans die each year as a result of cigarette smoking, accounting for 1 in every 5 deaths in the United States. Tobacco use is a particular concern of the Department of Defense (DoD) because the military overall has higher and heavier rates of tobacco use than does the civilian sector. For many years, the Department of the Navy has been concerned about the adverse effects of smoking on health and performance of military personnel, since cigarette use can influence military effectiveness and readiness.

Consistent with national policies restricting or totally banning smoking in large organizations, such as health care and educational settings, as well as in smaller environments, such as restaurants and airplanes, the U.S. Navy's primary health promotion goal is to create a healthy, smoke-free work environment. As the nation's largest employer, the DoD took a major step toward achieving this goal when it banned workplace smoking in April 1994, affecting some 3 million employees. However, establishing a healthy workplace means not only discouraging and restricting tobacco use among smokers but also preventing secondhand, environmental tobacco smoke exposure to nonsmokers. But, given the large number of smokers and the addictiveness of nicotine, this is no easy task.

In recent years, NHRC's health promotion program has focused on the reduction of tobacco products among active-duty personnel. In a forthcoming *Military Medicine* article, Ms. Suzanne Hurtado reports the results of a study on changes in smoking prevalence among Navy recruits. This study examined more than 400 Navy recruits who were smokers upon entering Navy recruit training. Recruits were prohibited from using tobacco for the duration of the 8 weeks of basic training. At the end of recruit training, 40% of the smokers had changed their classification to former smokers, and at the one-year follow-up, 19% of the initial smokers had classified themselves as former smokers, thus suggesting that the Navy's no-smoking policy during recruit training contributes to reducing smoking prevalence.

In another recent *Military Medicine* article, Dr. Terry Conway and Ms. Hurtado discussed Navy health care providers' attitudes and practices concerning their patients' tobacco use. Results from this study, which surveyed nearly 2,300 Navy health care providers, showed that of 11 cessation-oriented practices recommended by the Secretary of the Navy and the National Cancer Institute, most Navy health care providers (67-78%) engaged in only four behaviors with most or all of their tobacco-using patients. These behaviors were: advise to stop using tobacco, advise pregnant tobacco users of health risks to the fetus, inform patients of the benefits of quitting, and explain the dangers of using tobacco. Given that physician-delivered cessation counseling has been estimated to be more cost-effective than other common preventive medicine practices, Dr. Conway and Ms. Hurtado recommended that all Navy health care providers be trained to use the National Cancer Institute's team approach for tobacco cessation, and that strong organizational support to implement these procedures be provided.

The Navy's concern for a smoke-free work space, of course, is not limited to its shore-based worksites. Aboard all ships under the cognizance of the

Commander, Naval Air Forces, U.S. Atlantic Fleet, the use of smoking tobacco in any form is prohibited in all spaces unless a space meets strict specifications. In a recent article in *Aviation, Space, and Environmental Medicine,* Ms. Hurtado and her AIRLANT colleagues focused on crew members aboard 6 U.S. Atlantic Fleet aircraft carriers. This study documented crew members' reports of exposure to environmental tobacco smoke, smoking behavior and history, and attitudes regarding "no-smoking environment" policy. While the increased smoking restrictions significantly reduced environmental tobacco smoke exposure, there was very little change in smoking rate among crew members during this time, and, among some ships, smokeless tobacco use increased. Ms. Hurtado and colleagues recommended continued enforcement of the smoking restrictions, and command support and emphasis on all tobacco use prevention and cessation programs and activities.

Based on these important studies and recommendations, NHRC researchers plan to expand their focus from tracking and program evaluation to include smoking cessation and prevention program development and implementation. An example of this is Operation Stay Quit, a study currently under way with young Navy women graduating from recruit training. The goal of this study, which is testing the effectiveness of telephone-based counseling and of mailed educational and motivational information packets, is to help these women quit the smoking habit, and more importantly, to stay quit. This two-and-a-half-year study, funded by the Defense Women's Health Research Program, is a collaborative effort between San Diego State University and NHRC. Designed to address the everyday situations Navy women face, Operation Stay Quit interventions focus on issues particularly relevant to female smokers, such as fear of weight gain after smoking cessation, the need for social support, and the inevitable stress associated with breaking an addictive habit. Through these, and other health promotion and preventive medicine efforts, the Naval Health Research Center will continue to assist Navy medicine in meeting its commitment to ensure that Navy and Marine Corps personnel are fit to fight.

NHRC Experts Evaluate Equipment for the Marines

As outlined in the *Operational Maneuver From the Sea*, dominant maneuver and sustainment are principal capabilities for the U.S. Marine Corps in the 21st century. These capabilities will require skillful operations executed at a high tempo to accomplish decisive objectives. The success of these high tempo operations will depend on highly trained personnel using advanced technology and equipment. In continuing efforts to support Marine Corps personnel, the Naval Health Research Center conducts laboratory and field studies to evaluate equipment and procedures. The most recent efforts in this program have addressed backpack design and tent safety. As part of the Marine Enhancement Program, a replacement for the All-Purpose Lightweight Individual Carrying Equipment (ALICE) pack is being considered to reduce the risk of

injury caused by carrying heavy loads on the shoulders. An NHRC team led by Dr. Don Roberts conducted a sophisticated laboratory study to compare 13 commercial backpacks with the ALICE pack. This comparison was based on biomechanical, physiological, and subjective measurements of active-duty Marines carrying 100 lbs for 4 hours. While none of these backpacks is the ideal replacement for the ALICE (due to limitations with carrying war-fighting supplies), the study concluded that certain aspects of several backpacks can be incorporated into a new backpack

design. The new backpack should include a waist belt that carries the load (shoulder straps are used only to prevent forward or backward rotation of the load) and prevents the hand-numbing effect of the ALICE. The load should be carried as close to the center-of-mass as possible, so the pack frame should be as close to the back as possible (internal backpack design). The frame needs to be strong but flexible, and the vertical frame stays should attach to the waist belt on the sides of the hip rather than on the lower back (minimize lower back injury). The most important consideration is the fit, and the key measurement is the torso length (from top of shoulders to the top of hips). Any new backpack design must incorporate carriage of war-fighting supplies (ammunition and water) as part of the backpack while maintaining the ability to detach the two components. The development of a new backpack will reduce injury associated with carrying heavy loads on the shoulders and enhance maneuver and sustainment on the battlefield.

In an effort to reduce the weight of equipment and increase mobility of assault troops, the Marine Corps has incorporated a NorthFace® 4-man tent as the primary tent for field use. The tent has two components: (1) a tent with a floor and a single door, and (2) a rainfly with a door. Ventilation is achieved by opening the doors. Because cold weather operations involve the use of a stove, the Marine Corps was concerned about the quality of air in this tent when occupied and requested assistance from the NHRC. In response to this request, Dr. Roberts and Ms. Katie Canine tested 20 tents for carbon dioxide, oxygen, and carbon monoxide during winter training at the Marine Corps Mountain Warfare Training Center (MCMWTC). The tent fabric restricts the movement of gases across the fabric, and results of the study showed increases in carbon dioxide and decreases in oxygen when the tents were not ventilated. The only source of heat (also for cooking or melting snow for drinking water) for this tent is the Peak1® stove. The MCMWTC policy is to ignite the stove outside the tent and move it inside the tent. When a stove is ignited inside the tent, the carbon monoxide level is three times the acceptable limit (25 parts per million). As the stove warms, the production of carbon monoxide decreases, but prolonged use of the stove inside the tent creates unacceptable levels of carbon monoxide. Carbon monoxide combines with hemoglobin to form carboxyhemoglobin (COHb), which displaces the oxygen needed for cellular function. As the concentration of COHb increases, individuals will display various symptoms of carbon monoxide poisoning, including nausea, dizziness, and headache, and, if exposure is long enough, death can result. Based on these findings, researchers at the Naval Health Research Center are working with the Marine Corps to develop new guidelines to ensure high levels of air quality inside the NorthFace® 4-man tent during cold weather operations.

For further information contact NHRC at
(619) 553-8400 FAX (619) 553-9389
E-mail: CO@NHRC.Navy.mil or SD@NHRC.Navy.mil
Visit our web site: http://www.nhrc.navy.mil